CLAIMS

What is claimed is:

1.   A system that renders data in an industrial automation environment, comprising:

    a device analyzer that determines properties associated with a plurality of devices intended for delivery of data; and

    an HMI generator that generates code and/or data for the HMI in accordance with the determined properties of the devices, and delivers the delivers the code and/or data to the respective devices.

2.   The system of claim 1, the device analyzer comprising a memory and a processor.

3.   The system of claim 2, the processor utilizes artificial intelligence techniques to properly render the data.

4.   The system of claim 1, the HMI generator automatically modifies code and/or data associated with an existing HMI for display on a new device for which the HMI was not originally configured, wherein the HMI is modified according to the determined properties of the new device.

5.   The device analyzer of claim 1, wherein artificial intelligence techniques are employed in connection with manipulating a mapping.

6.   The system of claim 1, employed in a processing environment comprising at least one of:

    a personal computer;

    a desktop computer;

    a laptop computer;

    a personal digital assistant;

a hand-held computer;

a cell phone; and

a tablet computer.

7.   The system of claim 1, wherein one or more of the device(s) coupled to the HMI generator is least one of:

a display;

a data store; and

a server.

8.   The system of claim 1, the HMI generator comprising:

a processing element that facilitates creation of one or more multi-dimensional software objects that render data in multiple dimensions and/or formats at substantially the same time; and

a component that obtains a common data input for the one or more multi-dimensional software objects.

9.   The system of claim 8, wherein specific data is assigned to a software object.

10.   The system of claim 9, the data varies at least one of

size;

color;

translational location;

rotation of a software object:

text;

audio;

video;

visibility;

enable/disable state;

object state;

object type;

object text;

trending zoom level;

audio volume;

specification of audio clips;

specification of video clips; and

starting and/or stopping animation.

11.   The system of claim 8, wherein changes to the common data input affect the one or more multi-dimensional software objects.

12.   The system of claim 1, the HMI generator further comprising:

a component that associates one or more software objects with one or more physical devices; and

a component that generates software objects wherein the one or more software objects are associated with data corresponding to the one or more physical devices,

the physical devices affecting changes to the software objects and the software objects affecting changes to the physical devices.

13.   The system of claim 12, the one or more software objects imported from an outside source.

14.   The system of claim 12, further comprising an interface to facilitate selection of data to associate with physical devices.

15.   The system of claim 12, further comprising an interface to facilitate selection of specific attributes of software objects corresponding to data associated with physical devices.

16. The system of claim 1, further comprising:

a component that renders data based on one or more of a user access data level, a data type and a data state wherein the component is employed in an HMI residing in a processing environment.

17. The system of claim 16 further comprising a user-based association between displayed data and at least one of:

a user access level;

a data type; and

a data state.

18. A system that renders data in an industrial automation environment comprising:

a component that determines if the format and/or sub-format of the data is known to the system; and

an artificial intelligence component that determines the format of unknown data received by the HMI; and

a processing component that process and renders the data in the HMI in a suitable format.

19. The system of claim 18, the artificial intelligence locates and renders a partial data set.

20. The system of claim 18 further comprising a memory which stores previously unknown data types to compare with future data.

21. The system of claim 18, the HMI renders the data into at least one of

text;

audio;

video;

static image(s); and

interactive image(s).

22. The system of claim 18, providing an error message when data cannot be rendered.

23. The system of claim 18, wherein data is rendered in a format and/or sub-format suitable to the display capabilities of the device on which the data is to be presented.

24. A method to display data based at least in part on a zoom level selected by a user comprising:

displaying data in a plurality of disparate views; and

displaying respective views associated with a corresponding zoom level.

25. The method of claim 24, further comprising:

presenting data associated with a zoom level chosen by the user; and

suppressing data associated with a zoom level chosen by the user.

26. The method of claim 24, further comprising assigning the data and the zoom levels.

27. The method of claim 24, further comprising allowing the zoom level and the data to be associated in a non-linear relationship.

28.   The method of claim 24, further comprising an artificial intelligence component capable of inferring a default zoom level based on a user preference.

29.   A system that facilitates recognizing and/or creating a software object representing a physical device, comprising:

a software object generator that determines properties associated with a plurality of devices intended for creation of the software objects; and

an HMI generator that formats the data respectively in accordance with the determined properties of the devices.

30.   The system of claim 29 further comprising an artificial intelligence component utilized to recognize a new device added to the system.

31.   The system of claim 29 further comprising recognizing substantially all the components coupled to the system.

32.   The system of claim 29 further comprising a mapping element to provide connectivity to the physical devices.

33.   A method that facilitates rendering of data in an industrial automation environment, comprising:

determining formatting requirements associated with a plurality of devices intended for delivery of data; and

formatting the data respectively in accordance with the determined formatting requirements of the devices; and

delivering the formatted data to the respective devices.

34.   The method of claim 33, further comprising reformatting data associated with an existing HMI for delivery to a newly detected device based on the determined formatting requirements of the newly detected device.

35.   A method that facilitates rendering of data in an industrial automation environment comprising:

> receiving data from a physical device to an HMI; and
>
> comparing the data format to data formats known to the HMI; and
>
> determining the format of unknown data received by the HMI; and
>
> processing; and
>
> rendering the data in the HMI in a suitable format.

36.   A method that facilitates recognizing and/or creating at least one software object representing at least one physical device, comprising:

> determining the I/O and communications protocol of the at least one physical device; and
>
> formatting the data respectively in accordance with the determined properties of the devices; and
>
> creating a software object representing the device with I/O to interface with the physical device.

37.   A method that facilitates rendering of data in an industrial automation environment, comprising:

> means to determine properties associated with a plurality of devices intended for delivery of data; and
>
> means to format the data respectively in accordance with the determined properties of the devices; and
>
> means to deliver the formatted data to the respective devices.

38.   A method that facilitates rendering of data in an industrial automation environment comprising:

        means to determine if a format of the data is known to the system; and

        means to determine the format of unknown data received by the HMI; and

        means to process and render the data in the HMI in a suitable format.

39.   A method that facilitates recognizing and/or creating at least one software object representing at least one physical device, comprising:

        means to generate at least one software object by determining properties associated with a plurality of at least one of the devices intended for creation of the at least one of the software objects; and

        means to format the data respectively in accordance with the determined properties of the devices; and

        means to create at least one or more software objects representing the at least one device with I/O to interface with the at least one physical device.

40.   A method to display data based at least in part on a zoom level selected by a user comprising:

        means to display data in a plurality of disparate views; and

        means to display respective views associated with a corresponding zoom level.